Power Supply PCA Replacement (Continued)

Step 1 Removing the Top Enclosure Assembly

Remove:
- three screws
- top enclosure
- control pad ribbon cable and display assembly ribbon cable connectors

(See Section 7.4.4 for more detailed instructions on removing the top enclosure.)

Step 2 Removing the Main PCA

Remove:
- five screws
- blower wire connector
- power supply connector
- valve assembly connector
- pressure tubing
- mass flow sensor tubing
- Main PCA

(See Section 7.4.7 for more detailed instructions on removing the Main PCA.)

Step 3 Removing the Power Supply PCA

a. Using a Phillips screwdriver, remove the four screws securing the power supply PCA to the enclosure insert.

b. While holding the enclosure insert in place, lift the power supply PCA from the enclosure insert. It will be necessary to guide the AC input power receptacle from the cut-out in the enclosure insert.

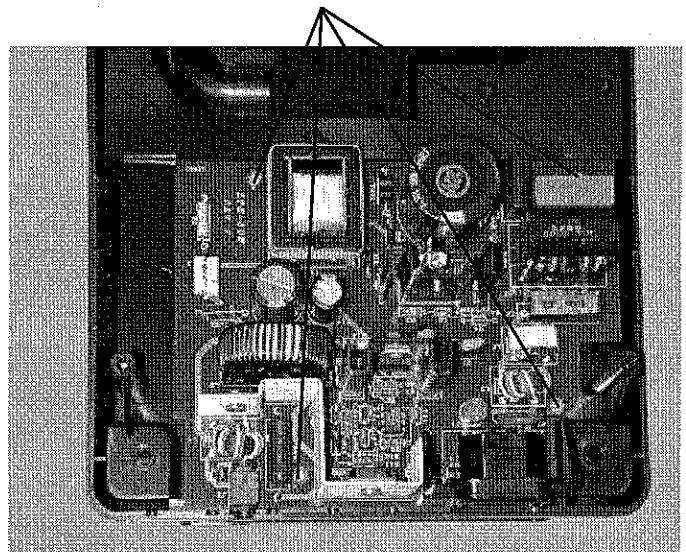

Figure 7-31
Location of the Power Supply PCA Screws

Power Supply PCA Replacement (Continued)

Step 4 Installing the Power Supply PCA

a. Align the holes in the power supply PCA with the holes in the enclosure insert. Note that the AC power input receptacle must be guided into the cut-out in the enclosure insert.

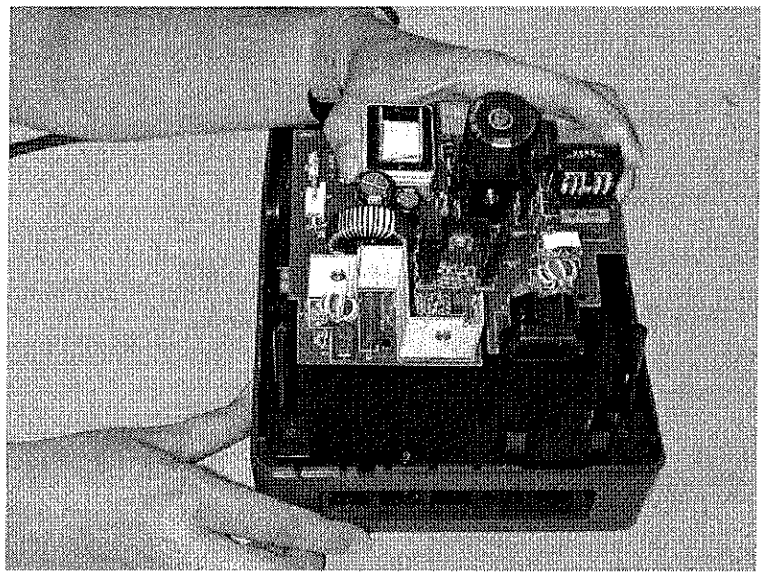

Figure 7-32
Replacing the Power Supply PCA

Step 5 Installing the Main PCA

Install:

- pressure tubing
- mass flow sensor tubing
- valve assembly connector
- power supply connector
- blower wire connector
- Main PCA
- five screws

(See Section 7.4.7 for more detailed instructions on installing the Main PCA.)

Step 6 Installing the Top Enclosure Assembly

Install

- control pad ribbon cable and display assembly ribbon cable connectors
- top enclosure
- three screws

(See Section 7.4.4 for more detailed instructions on installing the top enclosure assembly.)

7.4.14 Enclosure Insert Replacement

CAUTION: Due to required testing after replacement, this item is only replaceable at a Respironics Service Center equipped with a Multi Function Test Station.

Replacement Part Number 622184

Included in Kit:	Tools Required:
Enclosure insert	Phillips screwdriver (No. 2 medium)
Blower-to-enclosure insert seal	Torque wrench (in-lbs.)

Procedure

Removed / Installed During Process:

- Top enclosure (See Section 7.4.4 for more detailed instructions.)
- Main PCA (See Section 7.4.7 for more detailed instructions.)
- Pressure tubing (See Section 7.4.8 for more detailed instructions.)
- Outlet port (See Section 7.4.9 for more detailed instructions.)
- Blower assembly (See Section 7.4.10 for more detailed instructions.)
- Valve assembly (See Section 7.4.11 for more detailed instructions.)
- Flow Element / Flow Averaging Rings (See Section 7.4.12 for more detailed instructions.)
- Power Supply PCA (See Section 7.4.13 for more detailed instructions.)

WARNING: Electrical shock hazard: Disconnect the electrical supply before attempting to make any repairs to the device.

CAUTION: Electronic components used in this device are subject to damage from static electricity. Repairs made to this device must be performed only in an antistatic, ESD-protected environment.

Enclosure Insert Replacement (Continued)

Step 1 Removing the Enclosure Insert

a. While holding the bottom enclosure in place, lift the enclosure insert out of the bottom enclosure.

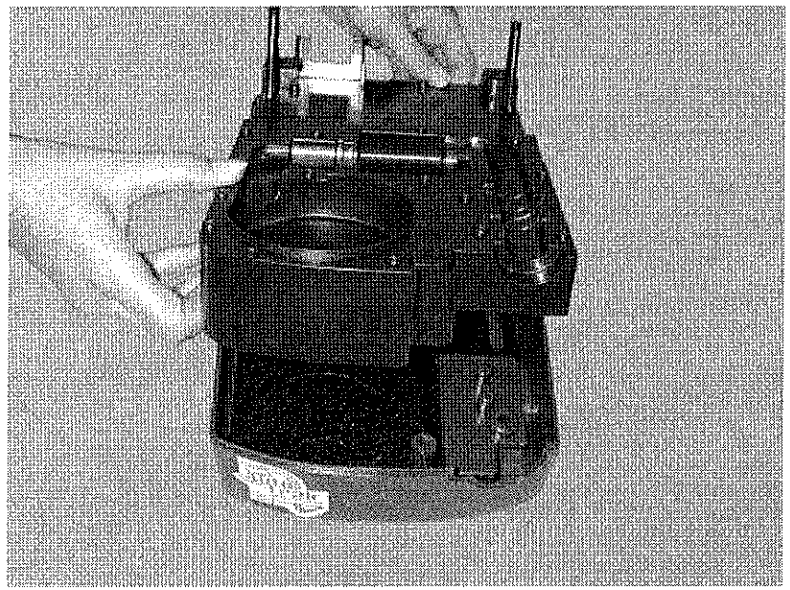

Figure 7-33
Removing the Enclosure Insert

Step 2 Installing the Enclosure Insert

a. Align the enclosure insert then place it into the bottom enclosure.

Step 3 Installing the Power Supply PCA

Install:
- power supply PCA
- four screws

(See Section 7.4.13 for more detailed instructions on installing the power supply PCA.)

Step 4 Installing the Flow Element and Flow Averaging Rings

Install:
- Flow element
- flow averaging rings

(See Section 7.4.12 for more detailed information on installing the flow element and flow averaging rings.)

Step 5 Installing the Valve Assembly

Install: valve assembly

(See Section 7.4.11 for more detailed instructions on installing the valve assembly.)

Enclosure Insert Replacement (Continued)

Step 6 Installing the Blower Assembly

Install:
- blower assembly
- blower-to-enclosure insert seal
- fifteen screws

(See Section 7.4.10 for more detailed instructions on installing the blower assembly.)

Step 7 Installing the Outlet Port

Install:
- outlet port

(See Section 7.4.9 for more detailed instructions on installing the outlet port.)

Step 8 Installing the Pressure Tubing

Install:
- pressure tubing
- mass flow sensor tubing

(See Section 7.4.8 for more detailed instructions on installing the pressure and mass flow sensor tubing.)

Step 9 Installing the Main PCA

Install:
- pressure tubing
- mass flow sensor tubing
- valve assembly connector
- power supply connector
- blower wire connector
- Main PCA
- five screws

(See Section 7.4.7 for more detailed instructions on installing the Main PCA.)

Step 10 Installing the Top Enclosure Assembly

Install:
- control pad ribbon cable and display assembly ribbon cable connectors
- top enclosure
- three screws

(See Section 7.4.4 for more detailed instructions on installing the top enclosure assembly.)

Chapter 8: Testing

8.1 Overview 8-3

8.2 Performance Verification 8-3

8.3 Performance Verification Data Sheet 8-7

8.4 BiPAP Pro MT1 Calibration 8-9

8.5 Calibration and Final Testing 8-11

Notes

Chapter 8: Testing

8.1 Overview

This chapter provides guidelines to do performance verification on the BiPAP Pro Bi-Level System.

8.2 Performance Verification

WARNING: To avoid electrical shock, disconnect the electrical supply before attempting to clean the BiPAP Pro Bi-Level System. DO NOT immerse the unit in water or allow any liquid to enter the cabinet or the filter intake.

CAUTION: Electronic components used in this device are subject to damage from static electricity. Use and follow appropriate Electro-Static Discharge (ESD) procedures.

Equipment

Digital Manometer
Test Adapter (RI P/N 622244)
Mild Soap Solution

NOTE: Performance Verification may be used as a way to determine that the BiPAP Pro Bi-Level System is functioning properly. This verification may be performed between rentals, during normal patient usage as routine maintenance, or after repairs have been performed on the BiPAP Pro Bi-Level System.

Step 1 Wipe the outside of the unit with a cloth slightly dampened with water and a mild detergent. Let the unit dry before reconnecting the electrical supply.

Step 2 The gray pollen filter is a reusable filter that screens out pollens and some household dust. This filter should be cleaned at least every two weeks by the patient and replaced every six months by the patient. The gray pollen filter should also be replaced when the BiPAP Pro Bi-Level System is being placed on a new patient. The pollen filter must be in place at all times when the unit is operating.

Step 3 The disposable white ultra-fine filter increases filtration of pollens, dust, some tobacco smoke, and small particles. The ultra-fine filter should be used in addition to the pollen filter. The ultra-fine filter should never be used with out the pollen filter. The patient should replace the ultra-fine filter after 30 days of use or sooner if it appears dirty. The ultra-fine filter should be replaced when the BiPAP Pro Bi-Level System is being placed on a new patient.

CAUTION: Failure to replace a dirty filter may cause the device to operate at higher than normal temperatures and damage the device.

Performance Verification (Continued)

Enter the therapy menu of the BiPAP Pro Bi-Level System. Set the IPAP and EPAP pressure to 10 cm H_2O. Place the BiPAP test orifice (RI P/N 622244) on the outlet of the unit. Exit the therapy menu and start the BiPAP Pro Bi-Level System by pressing the lower right user button on the keypad. Let the BiPAP Pro Bi-Level System run for a minimum time period of one hour after repairs have been made.

Step 4 Record the Serial No. of the unit located on the bottom enclosure.

Step 5 Connect the BiPAP Pro Bi-Level System to the proper line voltage for the country in which the unit is being used. Record the line voltage used for testing.

Step 6 Press the upper left User button on the BiPAP Pro Bi-Level System and record the blower hours.

Step 7 Connect a Digital Manometer to the outlet of the BiPAP Pro Bi-Level System. Place the Test Orifice (RI P/N 622244) on the end of the outlet.

a. Enter the therapy menu of the BiPAP Pro Bi-Level System.

b. Set the IPAP pressure to 6 cm H_2O and the EPAP pressure to 3 cm H_2O.

c. Exit the therapy menu and turn on the BiPAP Pro Bi-Level System.

d. Using your finger, occlude the outlet and record the EPAP pressure that is displayed briefly on the manometer. Unocclude the outlet and record the IPAP pressure that is displayed on the manometer.

e. Repeat steps 7-a through 7-d and record the results on the data sheet for each IPAP and EPAP setting that is listed on the data sheet.

Step 8 Establish a breathing pattern with the BiPAP Pro Bi-Level System by occluding and unoccluding the outlet. Observe the display of the BiPAP Pro Bi-Level System. The unit should toggle between IPAP and EPAP. Record the results on the data sheet.

Step 9 Enter the therapy menu of the BiPAP Pro Bi-Level System. Activate the Bi-Level Ramp Mode.

a. Exit the therapy menu and turn on the BiPAP Pro Bi-Level System blower.

b. Once the BiPAP Pro Bi-Level System has achieved the set IPAP and EPAP pressure, press the ramp button.

c. Observe the display and the manometer reading until the pressure increases, at least 1 cm H_2O.

d. Repeat steps 9-a through 9-c for the Linear Ramp Mode. Record the results on the data sheet.

Step 10 Place an Encore SmartCard into the BiPAP Pro Bi-Level System.

a. Press the upper left User button on the BiPAP Pro System.

b. The memory must be between 0 and 100%. Record the results on the data sheet.

NOTE: If the memory is less than 100%, the unit may be down loaded with the Encore software program (version 3.0) to ensure that the memory process is working properly.

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8.3 Performance Verification Data Sheet

NOTE: You should record all information on this data sheet after each test has been completed. Data sheet must then be signed in ink and dated by the technician performing the tests.

Step 1 Unit Cleaned _____ (Yes / No)

Step 2 Pollen Filter _____ (Cleaned / Replaced)

Step 3 Ultra Fine Filter _____ (Replaced)

Step 4 Serial No. _____

Step 5 Line Voltage _____ (VAC)

Step 6 Blower Hours _____

Step 7 Pressure Settings IPAP / EPAP

IPAP Pressure	EPAP Pressure
10 cm H_2O _____ (9 - 11 cm H_2O)	5 cm H_2O _____ (4 - 5 cm H_2O)
15 cm H_2O _____ (14 - 16 cm H_2O)	10 cm H_2O _____ (9 - 11 cm H_2O)
20 cm H_2O _____ (19 - 21 cm H_2O)	15 cm H_2O _____ (14 - 16 cm H_2O)

Step 8 Trigger Performance _____ (Pass / Fail)

Step 9 Ramp Performance Bi-Level _____ (Pass / Fail) Ramp Performance Linear _____ (Pass / Fail)

Step 10 Memory _____ (0 - 100%)

Tested By (Signature) _____ Date _____ / _____ / _____

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8.4 BiPAP Pro MT1 Calibration

NOTE: After any repair on a BiPAP Pro, the MT1 (pressure transducer) located on the Main PCA must be calibrated. After the pressure transducer is calibrated, it must then be tested on the Multi Functional Test Station.

Equipment

RI Digital Manometer
Hand Pump
Pressure Tubing (3 pieces)
1/8 inch "T" fitting
No. 2 Phillips (medium) screwdriver
Pot adjustment tool

Set up for calibration of MT1

Step 1. Remove the three screws that secure the top enclosure.

Step 2. Lift the top enclosure off of the UUT, but do not disconnect the ribbon cables.

Step 3. Remove the five screws that secure the Main PCA to the UUT.

Step 4. Disconnect the pressure tubing from Port B of MT1 on the Main PCA.

Step 5. Connect a Manometer, air pump, pressure tubing and 1/8 inch "T" to Pressure Port B on the Main PCA of the UUT.

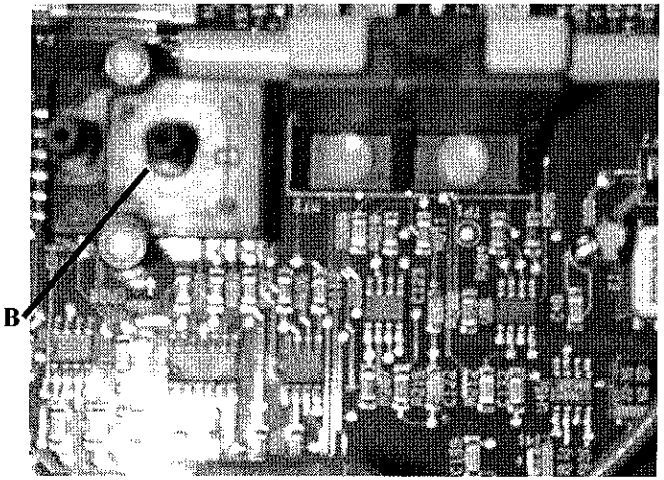

Figure 8-1: Pressure Port B

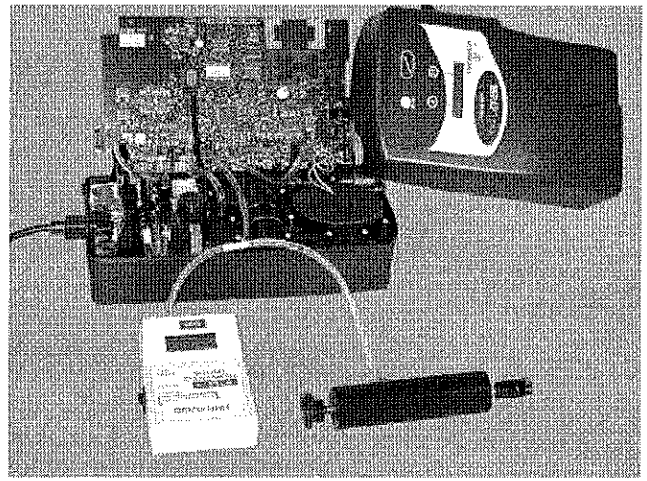

Figure 8-2: Calibration Set Up

Step 6. Enter the calibration mode by holding down the On/Off key and the upper right User key at the same time while connecting the UUT to an A.C. power source. Press the ramp button to get to Raw Pressure Calibration Screen.

Step 7. Observe the manometer and adjust the hand pump until the manometer reads 0.0 cm H_2O.

Step 8. Observe the display screen on the UUT. Cm should be equal to 0.0 H_2O.

Step 9. If the display does not read 0.0 cm H_2O, adjust R244 until the display reads: **Pr Sensor = 205 (+/- 3 or 202 to 208).**

Step 10. Wait for the UUT to self zero approximately 8-10 seconds.

Step 11. Observe the manometer and adjust the hand pump until the manometer reads 25.0 cm H_2O.

Step 12. Observe the display screen on the UUT. Cm should be equal to 25.0 cm H_2O.

Step 13. If the display does not read 25.0 cm H_2O, adjust R245 until the display reads **Pr Sensor = 705 (+/- 3 or 702 to 708).**

Step 14. Observe the manometer and adjust the hand pump until the manometer reads 0.0 cm H_2O.

Step 15. Repeat calibration if necessary starting with Step 10.

Step 16. If MT1 will not calibrate, replace Main PCA.

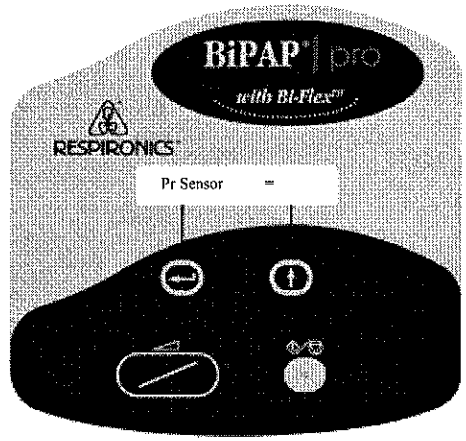

Figure 8-3: Display Screen 0.0

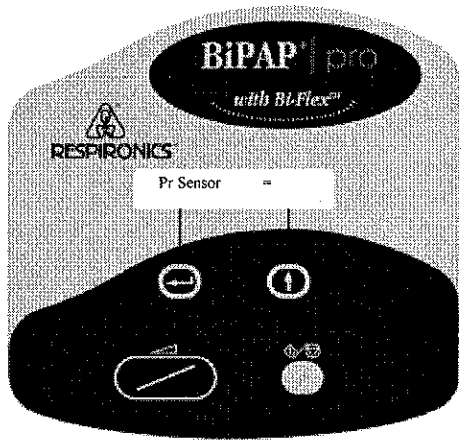

Figure 8-4: Display Screen 25.0

8.5 Calibration and Final Testing

NOTE: Calibration and Final Testing can only be performed at a Respironics Service Center equipped with a Multi-Functional Test Station.

CAUTION: Due to required calibration after parts replacement, the following may not be field replaced on the BiPAP Pro Bi-Level System unless the unit is System Final Tested at a Respironics Service Center equipped with a Multi Functional Test Station.

- Main Printed Circuit Assembly
- Pressure Tubing
- Mass Flow Sensor Tubing
- Blower Assembly
- Valve Assembly
- Flow Element
- Flow Averaging Rings
- Enclosure Insert

For technical assistance or replacement part ordering information, contact Respironics World Wide Technical Service.

U.S. and Canada

Phone: **1-800-345-6443**
Fax: **1-800-422-5816**

International

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Appendix A: Tools and Equipment

A.1 Service Tools and Supplies..... A-3

A.2 Acceptable Test Equipment..... A-4

Notes

Appendix A: Tools and Equipment

CAUTION: Due to required calibration after parts replacement, the following may not be field replaced on the BiPAP Pro Bi-Level System unless the unit is System Final Tested at a Respironics Service Center equipped with a Multi Functional Test Station.

- Main Printed Circuit Assembly
- Pressure Tubing
- Mass Flow Sensor Tubing
- Blower Assembly
- Valve Assembly
- Flow Element
- Flow Averaging Rings
- Enclosure Insert

A.1 Service Tools and Supplies

You should have the following hand tools and supplies available for troubleshooting, testing, and repairing the BiPAP Pro Bi-Level System.

- Flat-blade screwdriver - small
- Phillips screwdriver - medium
- Antistatic work station - minimum requirement is a grounded mat and wrist strap.
- Digital Manometer
- Mild detergent
- Isopropyl alcohol
- O_2 Enrichment Port (RI P/N 312010)
- Test Orifice (RI P/N 622244)
- Torque wrench (in-lbs.)

A.2 Acceptable Test Equipment

A.2.1 Digital Manometer*

Specifications:

0 - 25 cm H_2O (or better)

± 0.3 cm H_2O accuracy

± 0.1 cm H_2O resolution

Acceptable Options:

Respironics Digital Manometer
(RI P/N 302227)

Merical DP2001

Sensym PDM 200CD

RT-200

Any commercially available digital manometer that meets the above specifications.

* A water column manometer may also be used.

Appendix B: Schematics

B.1 Schematics Statement B-2

Main Board Processor B-3

Flow Sensor B-4

Pressure Sensor B-5

Valve Driver B-6

Main PCA Power Supply B-7

RS - 232 Decoupling Caps B-8

Motor Controller B-9

Appendix B: Schematics

B.1 Schematic Statement

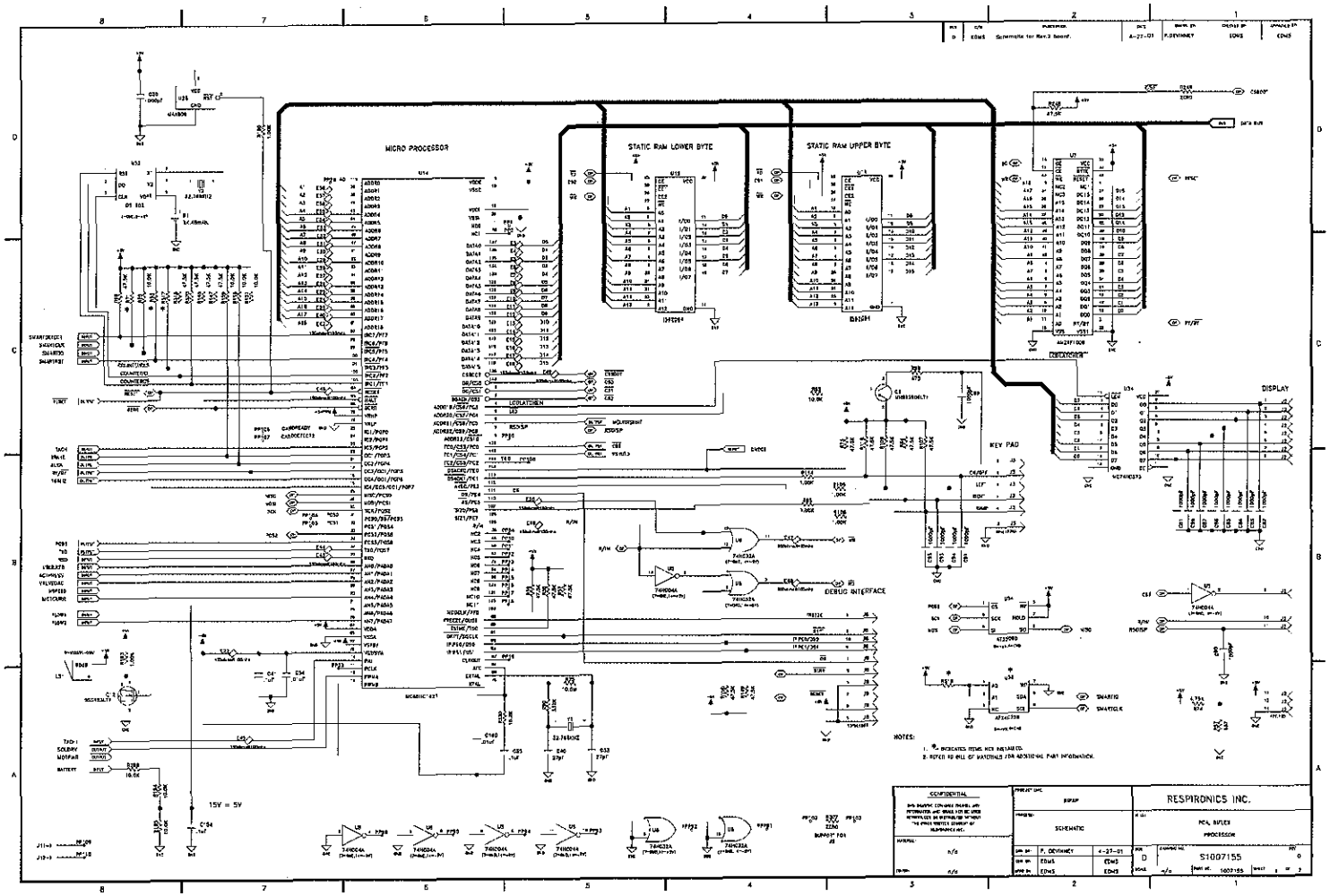
Schematics are supplied with this manual in direct support of the sale and purchase of this product.

The schematics are proprietary and confidential. Do not copy the schematics or disclose them to third parties beyond the purpose for which they are intended. Patents are pending.

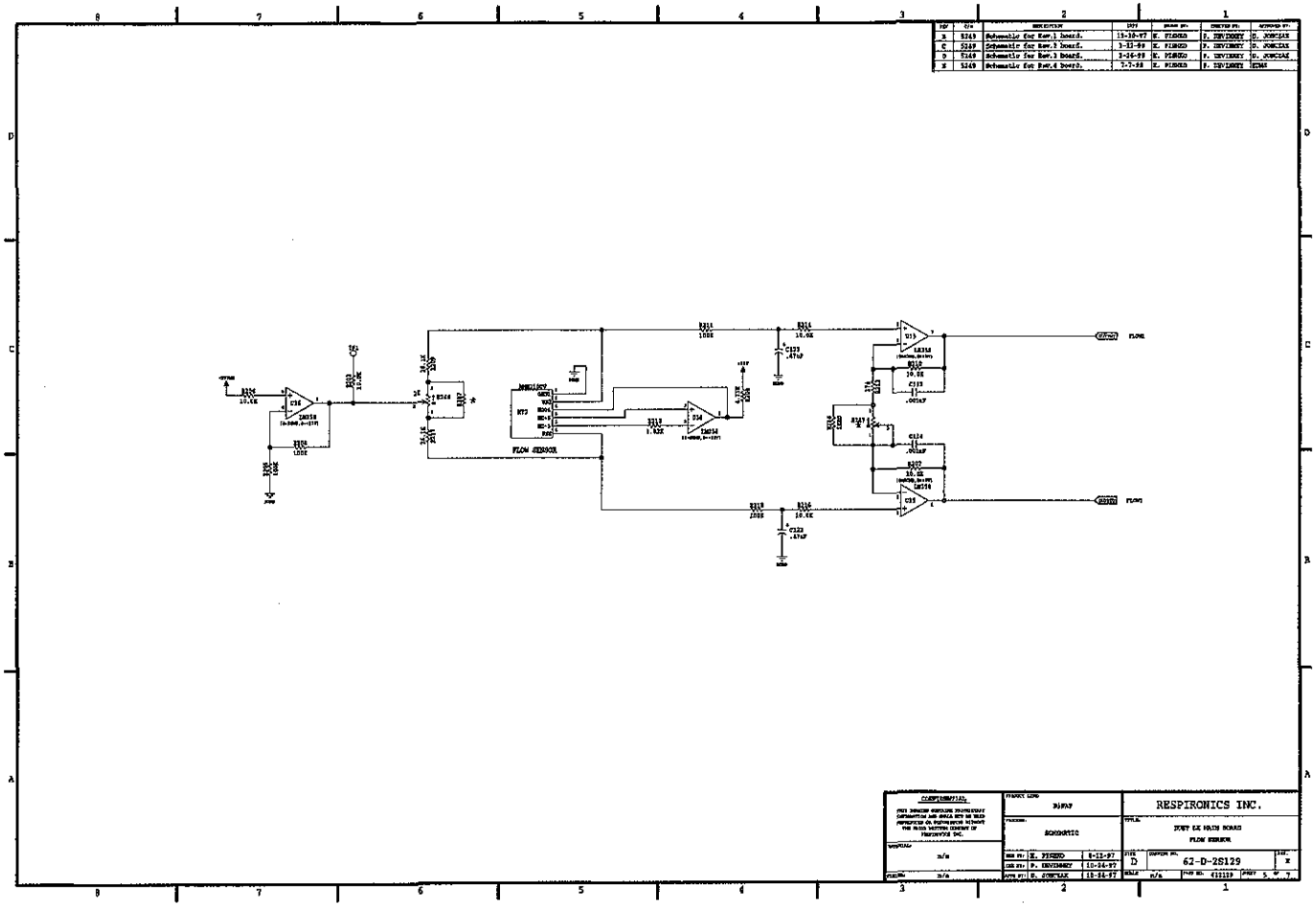
The schematics are intended to satisfy administrative requirements only. They are not intended to be used for component level testing and repair. Any changes of components could effect the reliability of the device, prohibit lot tracking of electronic components, and void warranties. Repairs and testing are supported only at the complete board level.

The schematics are of the revision level in effect at the time this manual was last revised. New revisions may or may not be distributed in the future.

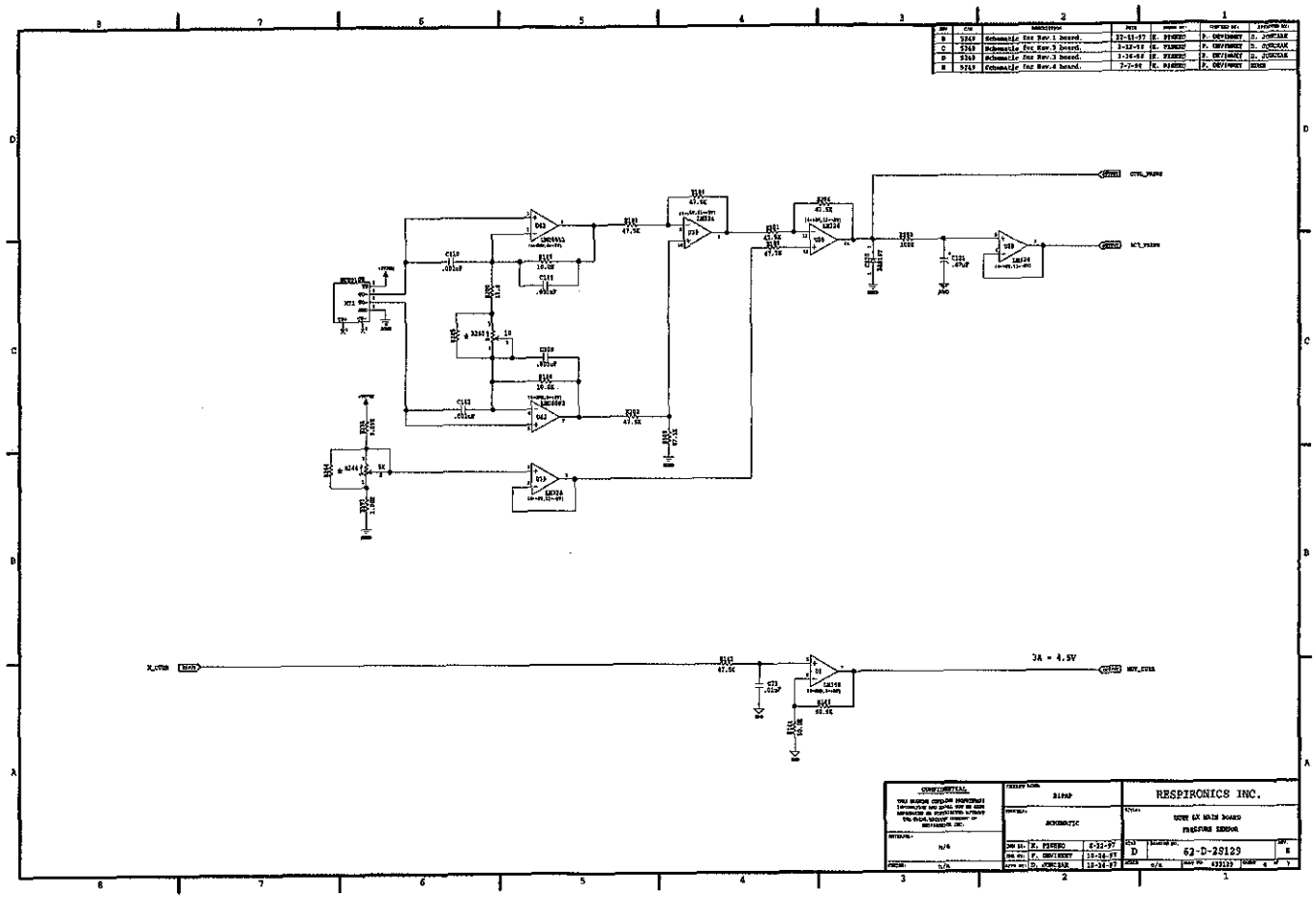
NOTE: The power supply PCA is a purchased item. The schematic is not available for distribution.



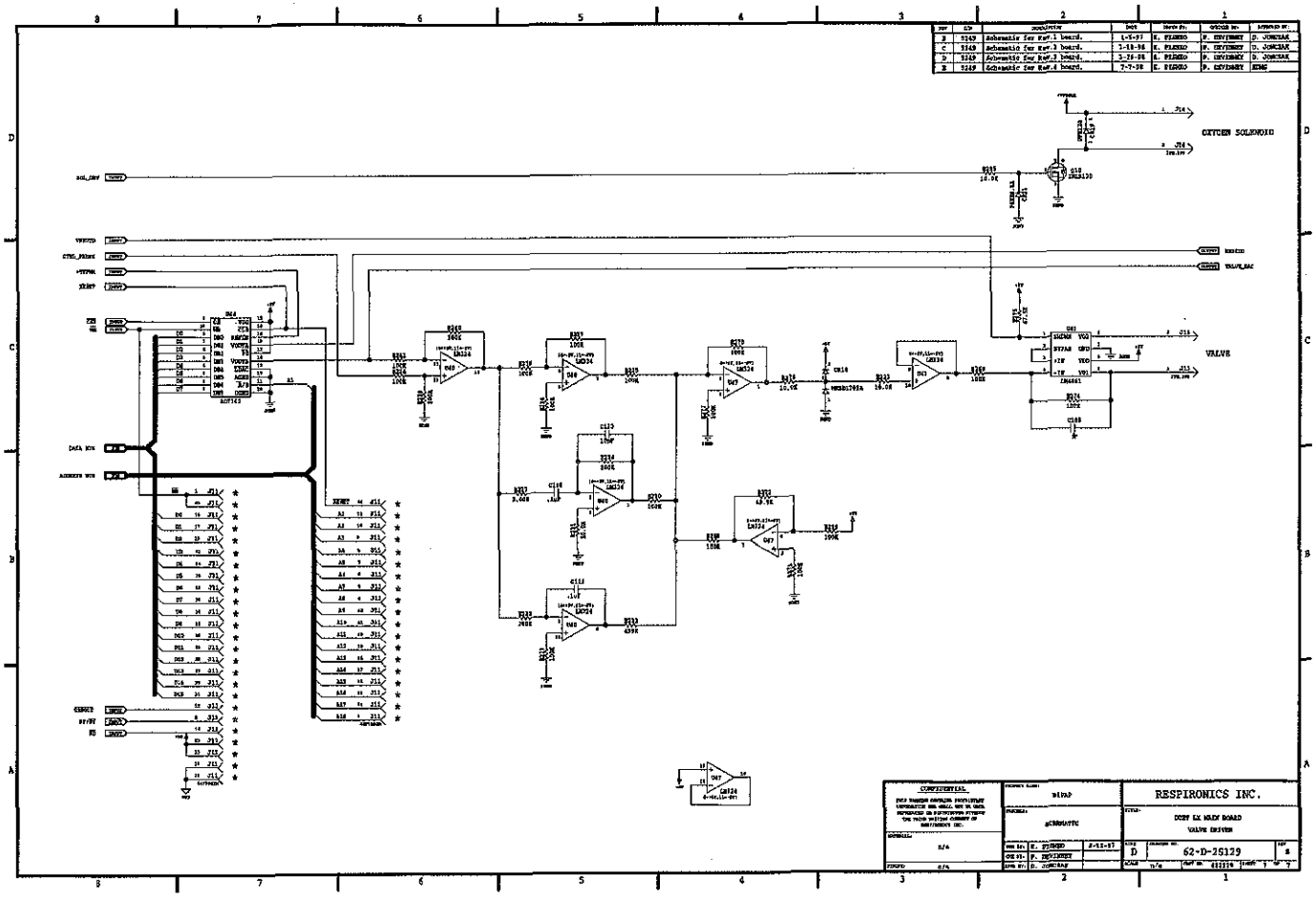
Main Board Processor



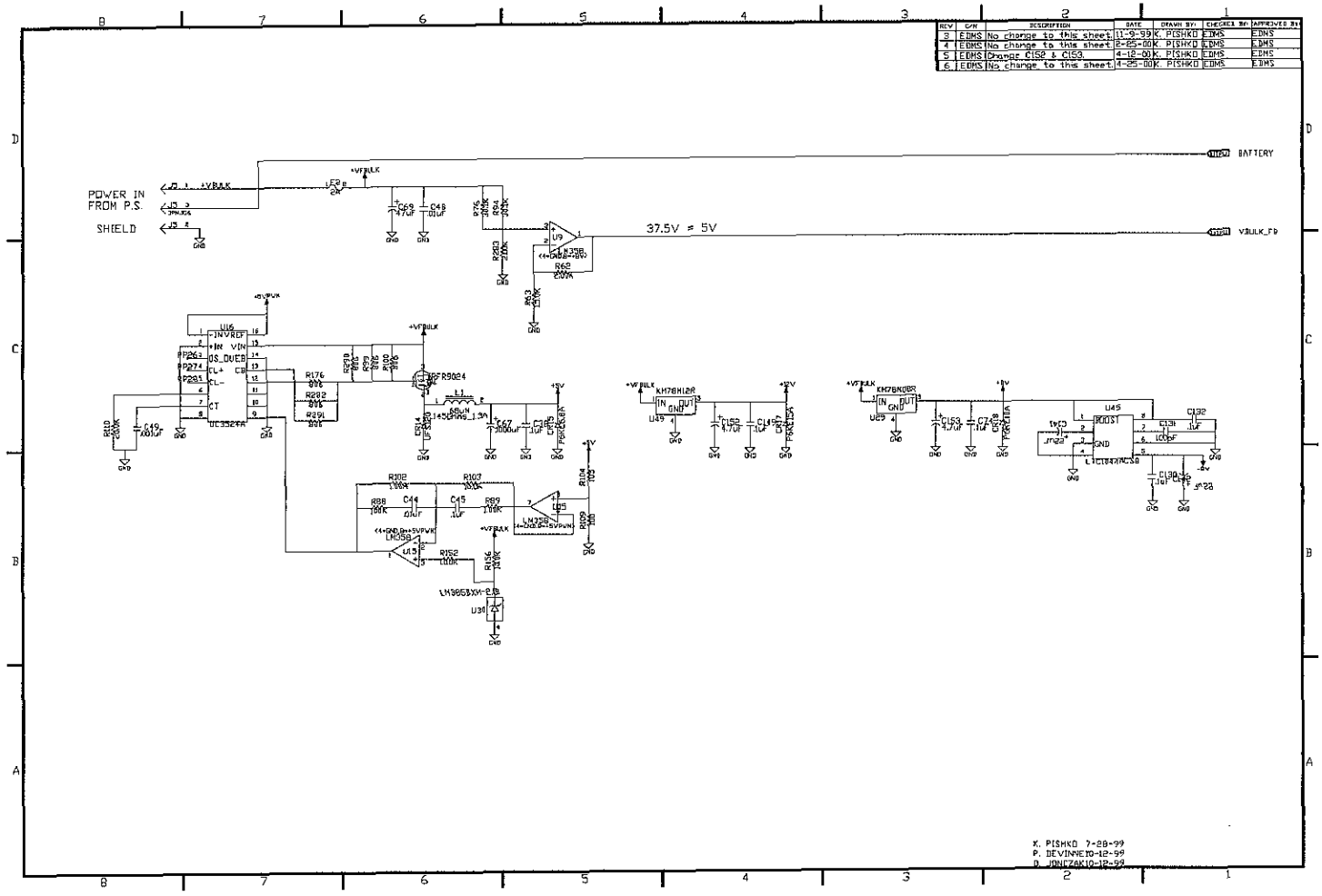
Flow Sensor



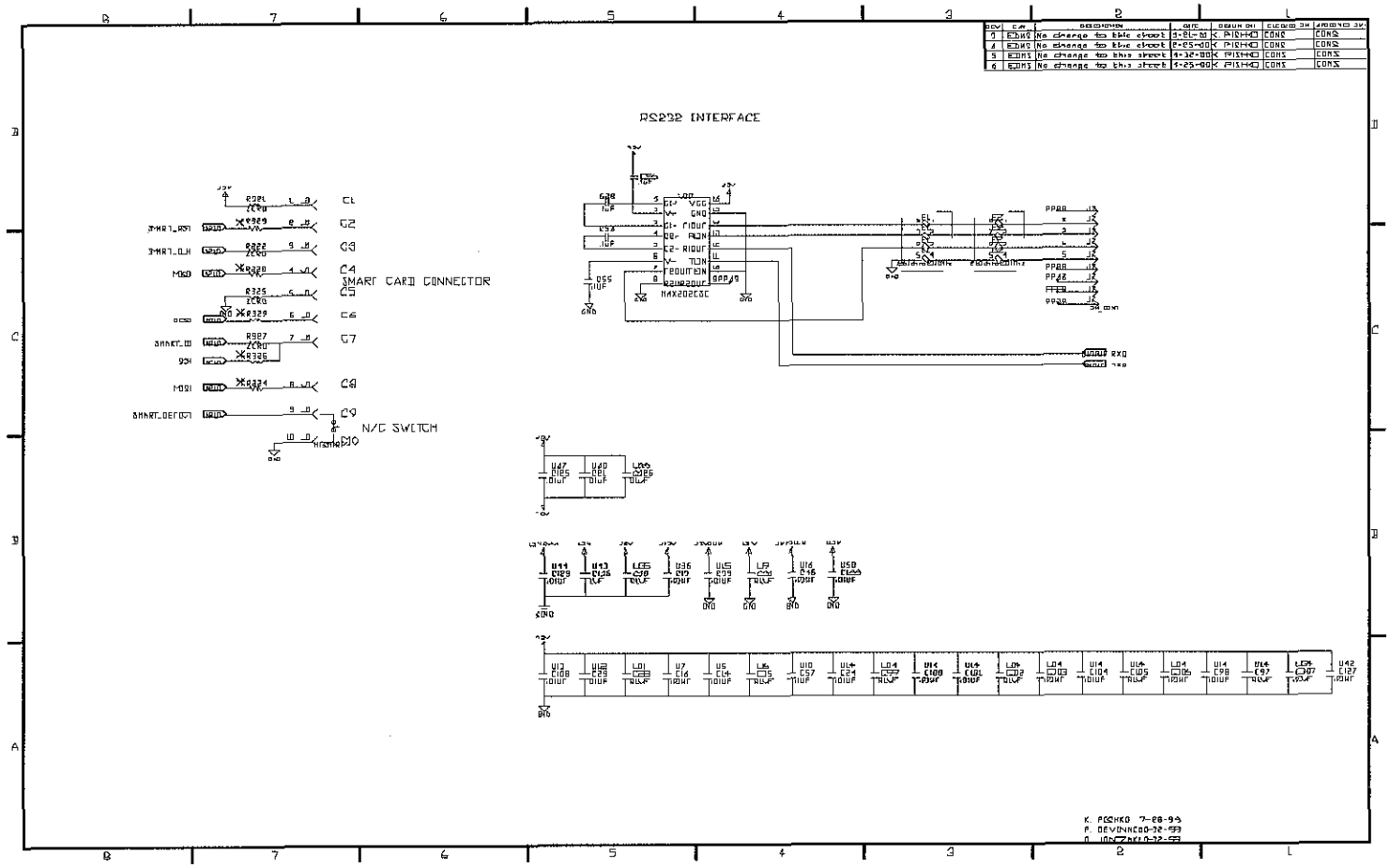
Pressure Sensor



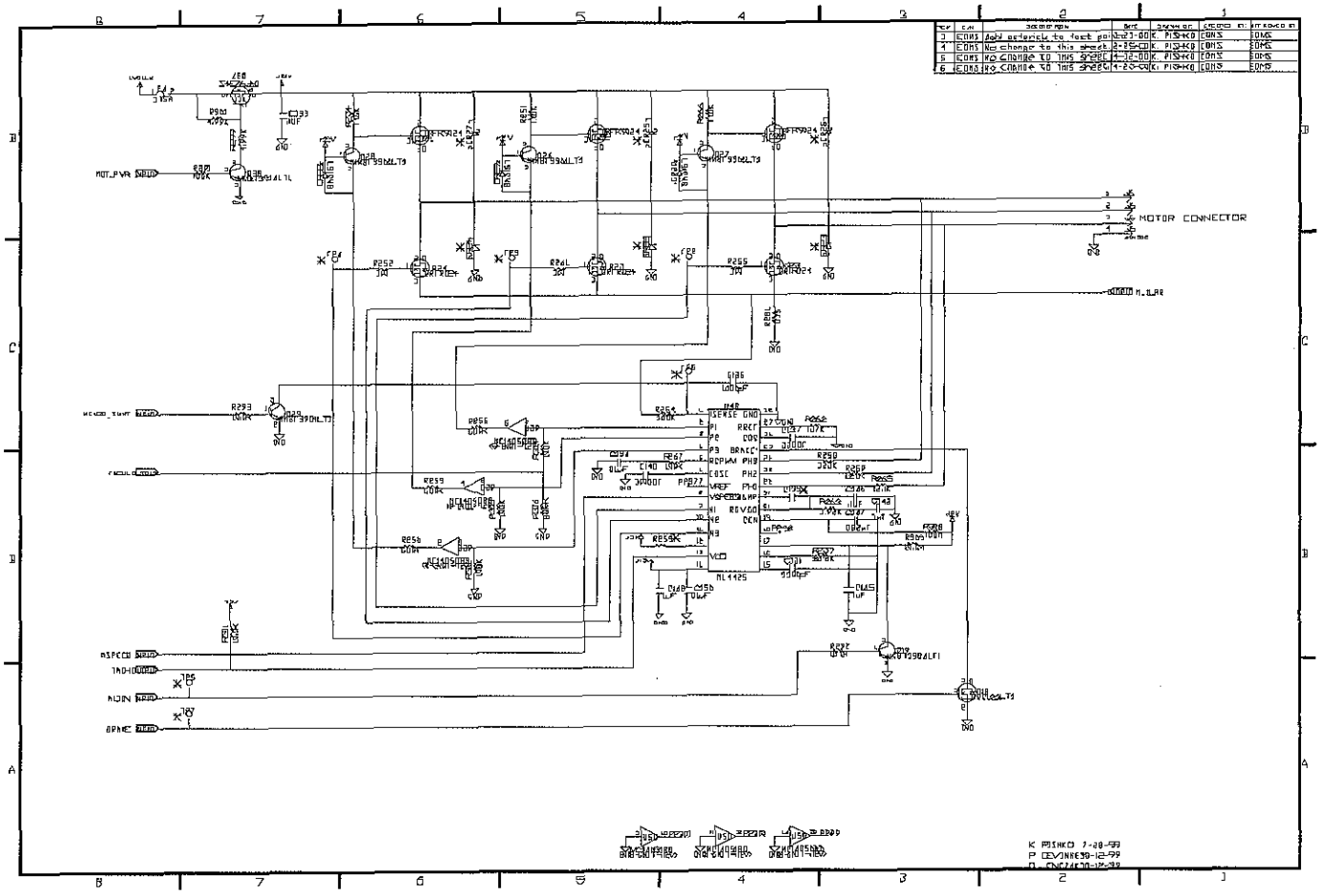
Valve Driver



Main PCA Power Supply



RS - 232 Decoupling Caps



Motor Controller

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